

Appendices

E Assessment of Extreme Drought Management Actions

In response to the representation comments on the draft Drought Plan regarding the extreme drought management actions, a summary environmental assessment of each of these actions has been included in this appendix to the SEA Environmental Report (as well as relevant information included as appendices to the HRA and WFD reports). As agreed with the Environment Agency, this is a “light touch” approach which sets out the triggers for carrying out more detailed assessment and data collation should an extreme drought event arise and the possible need for any of these measures becomes evident. These more detailed assessments will be discussed with the SEA statutory bodies once the trigger has been reached. This is a proportionate approach to actions that would only be contemplated in an extreme drought which has a very low likelihood of arising during the lifetime of the Drought Plan.

Also included in this appendix are the data requirements necessary to carry out the more detailed assessment should the need arise, along with a description of the approach to more detailed assessment if the applicable drought trigger is crossed.

The information is provided in Tables E2 to E10 for each of the extreme drought management actions included in the Drought Plan. Based on this summary assessment, an indicative prioritisation of these actions from an environmental perspective is set out below in Table E1.

Table E1. Indicative prioritisation of extreme drought management actions from an environmental perspective

Rank (from least impact to greatest impact)	Extreme Drought Action
1	Demand – media campaign to reduce pcc to 80 l/h/d
2	Supply – lowering pumps in boreholes
= 3	Supply – Re-instate source at Cold Bath Springs
= 3	Supply – Re-instate source at Gurney Slade
5	Temporarily amend the River Axe licence to allow abstraction for a longer period
= 6	Temporarily amend the Minimum Residual Flow conditions for the Alderley abstraction licence
= 6	Temporarily amend the Minimum Residual Flow conditions for the Chelvey abstraction licence
8	Demand – pressure reduction
9	Supply – Emergency storage and zero compensation releases

Table E2 Demand – media campaign

Type of action	Comments
Area affected	Whole supply area / whole resource zone
Trigger for implementation	Forecasting approach to the Level 4 trigger within 6 weeks.
Estimated benefit/saving	Aim to achieve average pcc of 80 l/h/d
Description	<p>This would be a significant media campaign focused on the 'day zero' concept that would aim to get customer use down to 80 l/h/d or lower to prevent the requirement for an emergency drought order. Customers would be asked to only use water that is absolutely necessary for sanitation and hygiene. No garden watering or car washing. This action is similar to the measured put in place in Cape Town in 2018 when the city was 90 days away from cutting off the municipal water supply.</p> <p>This campaign could be coordinated with other water companies if they were in a similar position and Water UK. We would also work with Government and regulators to support the messaging.</p>
Time to implementation	<p>Immediate via social media channels.</p> <p>1 week preparation for implementing other types of campaigns. Other media outlets would include advertising on radio, billboards, and busses. Headline news articles about the supply situation. CEO in media interviews.</p>
Permissions required	No formal permissions required.
Environmental Effects (SEA)	<p>Minor beneficial effects for SEA Biodiversity, flora and fauna topic objectives are anticipated regarding reduced demand for water and securing essential supplies of water for customers/businesses (SEA Population and Human Health topic objectives). Reducing the demand for water will also have minor beneficial effects on maintaining surface water and groundwater levels/flows and sustainable management of abstraction (SEA Water topic objectives). Reducing water demand will also help to improve the resilience of water supplies during the drought.</p> <p>Minor or negligible adverse effects are anticipated with respect to the other SEA topics.</p>
Data requirements to support detailed assessment	Existing baseline data from SEA Environmental Report plus the prevailing pcc data available to Bristol Water during the actual drought event, taking account of the savings already achieved from the Temporary Use Ban and Non-Essential Use Ban measures Consultation with customers and consumer groups, regulators and local authorities about this measure will also inform the SEA.
Trigger and further assessment required if option is to be implemented during an extreme drought	The additional environmental data relevant to the option will be collated when the Level 3 (DMZ 5) trigger is reached to carry out a detailed assessment in accordance with the SEA methodology if the option is likely to be required following dialogue with the EA. The assessment will particularly need to take account of the specific measures to be considered to help reduce pcc to 80 l/h/d as this will inform the assessment, particularly any effects on SEA social topics and objectives (e.g. Population and Human Health).

Table E3 Demand – pressure reduction

Type of action	Comments
Area affected	Whole supply area / whole resource zone/ could be applied at DMA level and below if needed.
Trigger for implementation	Forecasting approach to the Level 4 trigger within 6 weeks.
Estimated benefit/saving	Unknown, but reduced pressure would reduce customer use/waste and leakage.
Description	Pressure reduction would be phased over the course of the drought. This action would be to reduce pressure at the customers tap to below the regulatory standards with the aim of reducing demand to 80l/h/d or lower, and to reduce leakage.
Time to implementation	Pressure reduction would have been gradually implemented throughout the duration of the drought. This would require a phased approach over the course of 4 weeks to implement this phase.
Permissions required	Notice to the fire service under Section 43(2) of the Fire and Rescue Service Act 2004. Close liaison with regulators (Ofwat & EA) and Government on implementation of action due to breach of Ofwat standards for network pressure.
Environmental Effects (SEA)	<p>Potential major adverse effects in respect to SEA Population and Human Health due to the potential risk to the provision of adequate fire-fighting water supplies and the potential risk of bacteriological ingress or other drinking water quality risks due to low pressure in some distribution mains and supply pipes.</p> <p>Minor but temporary adverse effects anticipated with respect to population and human health due to nuisance effects associated with reduced water pressure, including to some hot water boiler systems and shower units.</p> <p>Minor temporary beneficial effects anticipated with respect to SEA population and human health due to the provision of additional essential water supplies in an extreme drought event by reducing water demand and leak volumes. Minor temporary beneficial effects anticipated with respect to the SEA air and climate topic associated with reduced energy use and associated greenhouse gas emissions.</p> <p>Minor or negligible adverse effects are anticipated with respect to the other SEA topics.</p>
Data requirements to support detailed assessment	Existing baseline data from SEA Environmental Report plus relevant water supply data obtained during the drought in respect of any pre-existing water pressure issues prior to implementation of this option and any pre-existing benefits to demand and leakage levels
Trigger and further assessment required if option is to be implemented during an extreme drought	The additional environmental and social data relevant to the option will be collated when the Level 3 (DMZ 5) trigger is reached to carry out a detailed assessment in accordance with the SEA methodology if the option is likely to be required following dialogue with the EA. The assessment will particularly need to take account of the specific measures to be considered to protect the fire service and adverse impacts on customer hot water systems.

Table E4 Supply - Temporarily amend the River Axe licence to allow abstraction for a longer period

Type of action	Comments
Area affected	Whole supply area / whole resource zone
Trigger for implementation	Forecasting approach to the Level 4 trigger within 6 weeks.
Estimated benefit/saving	Additional yield of between 1.5MI/d and 6.5MI/d depending on the severity of the drought and flow availability in the river.
Description	Bristol Water has a licence to abstract from the River Axe over the winter period from November and April. This water is pre-treated and then transferred into Cheddar Reservoir. An extension of the abstraction period and the total annual licence volume would provide additional support for reservoir refill over the winter period. Under this option Bristol Water are proposing an extension of the period of abstraction by 2 months to include May and October (period of abstraction extended from November – April, to October to May) and an increase in the annual abstraction volume from 4750MI/year to 7145MI/year (increase of 2395MI/year). As the drought permit would be valid for up to 6 months, Bristol Water would apply for the appropriate terms of licence extension based on the time of year the application is being submitted.
Time to implementation	Minimum of 6 weeks if no public hearing required, depending on the supporting environmental information available. Longer if a public hearing is called.
Permissions required	Drought permit from the Environment Agency.
Environmental Effects (SEA)	<p>Major, short term adverse effects are anticipated on biodiversity due to potential for adverse effects on the Severn Estuary SAC and Ramsar site.</p> <p>Moderate adverse, short term temporary effects anticipated regarding the SEA water topic associated with reductions in flow. Moderate, short term adverse effects are also anticipated to invertebrates and fish populations in the River Axe resulting from a reduction in flow. Moderate adverse, short term temporary effects anticipated regarding the SEA landscape and visual amenity topic associated with the proximity of Mendip Hills AONB and reduced flows in the river.</p> <p>Minor or negligible adverse effects are anticipated with respect to the other SEA topics.</p> <p>Minor beneficial effects are anticipated with respect to population and human health due to the provision of additional essential water supplies in an extreme drought event.</p> <p>Negligible beneficial effects are anticipated with respect to the other SEA topics.</p> <p>Also potentially requires a cumulative assessment with other drought actions which may be in place in the River Axe catchment at the time: notably a Honeyhurst and Well Head (Rodney Stoke) abstraction and a Cheddar Ponds Drought Permit.</p>
Data requirements to support detailed assessment	<p>Existing baseline data from SEA Environmental Report.</p> <p>Data to support the preparation of EARs (incorporating Environmental Monitoring Plans) in line with Defra and Environment Agency Guidance, taking full account of designated sites and in-combination effects with other drought management actions.</p> <p>Undertake walkover surveys of potentially impacted reaches to improve the detail and breadth of possible migratory fish barriers and identify possible mitigation measures. This will inform likely requirement for Appropriate Assessment as well as the EARs.</p>
Trigger and further assessment required if option is to be implemented during an extreme drought	The additional environmental data relevant to the option will be collated when the Level 3 (DMZ 5) trigger is reached to carry out a detailed assessment in accordance with the SEA methodology if the option is likely to be required following dialogue with the EA. Further assessment for the SEA will be informed by the development of the EAR to accompany the drought permit application.

Table E5 Supply - Temporarily amend the Minimum Residual Flow conditions for the Alderley abstraction licence

Type of action	Comments
Area affected	Whole supply area / whole resource zone
Trigger for implementation	Forecasting approach to the Level 4 trigger within 6 weeks.
Estimated benefit/saving	Estimated yield of c. 2MI/d. This is based on a change to the authorised quantities of water to be abstracted at Alderley when flow in the Ozleworth Brook is less than 13 MI/d.
Description	Bristol Water has a groundwater licence to abstract at Alderley throughout the year. The volume of water that can be abstracted is linked to the flow in the Ozleworth Brook. A change to the maximum quantity authorised to be abstracted under the specified flow conditions would enable abstraction to continue under drought conditions. Under this option it is proposed that abstraction of up to 4.5MI/d would be permitted when flows in the Ozleworth Brook drop below 13MI/d.
Time to implementation	Minimum of 6 weeks if no public hearing required, depending on the supporting environmental information available. Longer if a public hearing is called.
Permissions required	Drought permit from the Environment Agency
Environmental Effects (SEA)	<p>Major, short term adverse effects are anticipated on biodiversity due to potential adverse effects on the Severn Estuary SAC and Ramsar site.</p> <p>Moderate adverse, medium term temporary effects anticipated regarding the SEA Water topic associated with potential for moderate reductions in surface water flow and levels in Ozleworth Brook and the Little Avon. This would likely result in adverse impacts on fish and invertebrates. Potential moderate adverse effects regarding the SEA population and human health topic associated with temporary reduction in the recreational value of the watercourse. Moderate adverse, medium term temporary effects anticipated regarding the SEA archaeology and cultural heritage topic and the landscape and visual amenity topic associated with reductions of flow and level potentially impacting on designated sites.</p> <p>Minor or negligible adverse effects are anticipated with respect to the other SEA topics.</p> <p>Minor beneficial effects are anticipated with respect to population and human health due to the provision of additional essential water supplies in an extreme drought event.</p> <p>Negligible beneficial effects are anticipated with respect to the other SEA topics.</p>
Data requirements to support detailed assessment	<p>Existing baseline data from SEA Environmental Report.</p> <p>Data to support the preparation of EARs (incorporating Environmental Monitoring Plans) in line with Defra and Environment Agency Guidance, taking full account of designated sites and in-combination effects with other drought management actions.</p> <p>Undertake walkover surveys of potentially impacted reaches to improve the detail and breadth of possible migratory fish barriers and identify possible mitigation measures. This will inform likely requirement for Appropriate Assessment as well as the EARs.</p>
Trigger and further assessment required if option is to be implemented during an extreme drought	The additional environmental data relevant to the option will be collated when the Level 3 (DMZ 5) trigger is reached to carry out a detailed assessment in accordance with the SEA methodology if the option is likely to be required following dialogue with the EA. Further assessment for the SEA will be informed by the development of the EAR to accompany the drought permit application.

Table E6 Supply - Temporarily amend the Minimum Residual Flow conditions for the Chelvey abstraction licence

Type of action	Comments
Area affected	Whole supply area / whole resource zone
Trigger for implementation	Forecasting approach to the Level 4 trigger within 6 weeks.
Estimated benefit/saving	2.2 MI/d based on the assumption of reducing the minimum flow condition at the River Kenn at Kenn Gauge to 2.21MI/d.
Description	Bristol Water has a groundwater licence to abstract from Chelvey Well throughout the year. The volume of water that can be abstracted is linked to the flow at the Kenn gauge. During the summer, reduced river flows can restrict the volume of water available for abstraction. A change to the minimum flow at which abstraction is allowed would enable abstraction to continue for a longer period under drought conditions. Under this option Bristol Water are proposing that the flow at the Kenn gauge above which abstraction is allowed is reduced from 4.41MI/d to 2.21MI/d.
Time to implementation	Minimum of 6 weeks if no public hearing required, depending on the supporting environmental information available. Longer if a public hearing is called.
Permissions required	Drought permit from the Environment Agency.
Environmental Effects (SEA)	<p>Major, short term adverse effects are anticipated on biodiversity due to potential adverse effects on the Severn Estuary SAC and Ramsar site.</p> <p>Moderate adverse, medium term temporary effects anticipated regarding the SEA water topic associated with reduction in groundwater levels and a reduction in velocity in the River Kenn (noting the extensive weir network along the watercourse). As a result of these effects on the River Kenn there is the potential for adverse effects to water quality, fish and invertebrate populations.</p> <p>Minor or negligible adverse effects are anticipated with respect to the other SEA topics.</p> <p>Minor beneficial effects are anticipated with respect to population and human health due to the provision of additional essential water supplies in an extreme drought event.</p> <p>Negligible beneficial effects are anticipated with respect to the other SEA topics.</p>
Data requirements to support detailed assessment	<p>Existing baseline data from SEA Environmental Report.</p> <p>Data to support the preparation of EARs (incorporating Environmental Monitoring Plans) in line with Defra and Environment Agency Guidance, taking full account of designated sites and in-combination effects with other drought management actions.</p> <p>Undertake walkover surveys of potentially impacted reaches to improve the detail and breadth of possible migratory fish barriers and identify possible mitigation measures. This will inform likely requirement for Appropriate Assessment as well as the EARs.</p>
Trigger and further assessment required if option is to be implemented during an extreme drought	The additional environmental data relevant to the option will be collated when the Level 3 (DMZ 5) trigger is reached to carry out a detailed assessment in accordance with the SEA methodology if the option is likely to be required following dialogue with the EA. Further assessment for the SEA will be informed by the development of the EAR to accompany the drought permit application.

Table E7 Supply – Emergency storage and zero compensation releases

Type of action	Comments
Area affected	Whole supply area / whole resource zone
Trigger for implementation	Forecasting approach to the Level 4 trigger within 6 weeks.
Estimated benefit/saving	<p>The Emergency storage in the Mendip Reservoirs provides approximately 30 days supply as required from this part of the system.</p> <p>Assuming the compensation releases from the reservoirs have already been reduced, then between an additional 6.8MI/d and 11.6 MI/d would be available by reducing them to zero.</p>
Description	On breaching the emergency storage level in the reservoirs, we would reduce the compensation volumes to zero in order to keep as much water in the reservoirs and available for public water supply as possible.
Time to implementation	Immediate. Reservoir level would drop into the emergency storage area and the compensation would be reduced to zero.
Permissions required	Drought permit from the Environment Agency to amend the licence conditions to implement zero compensation releases from reservoirs.
Environmental Effects (SEA)	<p>Major adverse, short term temporary effects anticipated regarding the SEA water topic associated with major reduction in flow and levels as well as the resulting major adverse effects regarding water quality (including those resulting from zero or minimal dilution of treated wastewater effluent) Major adverse effects anticipated regarding the biodiversity, fauna and flora topic, for example due to major reductions in habitat availability and reductions in water quality. Potential major adverse effects regarding the SEA population and human health topic associated with temporary reduction in the recreational value of the watercourse (including potential medium to long term effects associated with loss of fish stocks). Major but temporary adverse effects anticipated regarding the SEA landscape and visual amenity topic due to the lower river levels and the setting of the Mendip Hills AONB.</p> <p>Moderate to Major adverse, medium term, temporary effects anticipated regarding the SEA soil, geology and land use topic associated with effects on fluvial geomorphology.</p> <p>Minor or negligible adverse effects are anticipated with respect to the other SEA topics.</p> <p>Minor to Moderate beneficial effects are anticipated with respect to population and human health due to the provision of additional essential water supplies in an extreme drought event.</p> <p>Negligible beneficial effects are anticipated with respect to the other SEA topics</p>
Data requirements to support detailed assessment	<p>Existing baseline data from SEA Environmental Report.</p> <p>Data to support the preparation of EAR(s)</p>
Trigger and further assessment required if option is to be implemented during an extreme drought	The additional environmental data relevant to the option will be collated when the Level 3 (DMZ 5) trigger is reached to carry out a detailed assessment in accordance with the SEA methodology if the option is likely to be required following dialogue with the EA. Further assessment for the SEA will be informed by the development of the EAR(s) to accompany the drought permit application.

Table E8 Supply – lowering pumps in boreholes

Type of action	Supply – lowering pumps in boreholes
Area affected	Whole supply area / whole resource zone
Trigger for implementation	Forecasting that Bristol Water are going to be approaching the Level 4 (DMZ6) trigger within 6 weeks
Estimated benefit/saving	Unknown. Groundwater sources would be selected based on the drought response and how resilient they have been.
Description	If pump levels were the limiting factor in the groundwater source supply, and water was still available for abstraction below the normal pumping water level, then we would consider lowering the pumps to enable the remaining water to be abstracted.
Time to implementation	Relatively short time to implement this response. Depending on the site it is likely to require some engineering works.
Permissions required	Possible drought permit if action resulted in abstracting outside licence conditions. This would be reviewed on a site by site/licence by licence basis in close liaison with the Environment Agency.
Environmental Effects (SEA)	<p>Moderate temporary adverse effects anticipated regarding the water topic associated with a further reduction to local groundwater levels and storage. These effects have the potential to result in moderate effects regarding the biodiversity, fauna and flora topic due to potential effects on groundwater dependent ecosystems and/or any dependent surface waters. There may also be moderate temporary adverse effects in respect of other abstractors (SEA Water topic objectives).</p> <p>Minor to moderate adverse, medium term temporary effects are anticipated with respect to landscape and visual amenity due to water level changes to groundwater-dependent watercourses. Similarly, potential for minor to moderate adverse effects with respect to the archaeology and cultural heritage topic regarding any heritage assets located in the zone of influence, including any paleoenvironmental deposits and the potential presence of historic remains.</p> <p>Minor or negligible adverse effects anticipated with respect to other SEA topics.</p> <p>Minor beneficial effects are anticipated with respect to population and human health due to the provision of additional essential water supplies in an extreme drought event.</p> <p>Negligible beneficial effects are anticipated with respect to the other SEA topics.</p>
Data requirements to support detailed assessment	<p>Existing baseline data from SEA Environmental Report.</p> <p>Site specific details regarding borehole pump lowering against existing level.</p> <p>Site specific details of hourly, daily, annual abstraction rates at lower pump level.</p> <p>Baseline data on groundwater levels in the area and any available drawdown data.</p> <p>Location of any GWDTEs and/or dependent surface water bodies plus any other abstractors.</p> <p>The presence and location of any paleoenvironmental deposits or historic remains in waterlogged conditions.</p>
Trigger and further assessment required if option is to be implemented during an extreme drought	The additional environmental data relevant to the option will be collated when the Level 3 (DMZ 5) trigger is reached to carry out a detailed assessment in accordance with the SEA methodology if the option is likely to be required following dialogue with the EA. Further assessment will follow the EAR approach to confirm the summary impacts identified in this table.

Table E9 Supply – Re-instate source at Cold Bath Springs

Type of action	Comments
Area affected	Whole supply area / whole resource zone
Trigger for implementation	Forecasting approach to the Level 4 trigger within 6 weeks.
Estimated benefit/saving	3MI/d annual average yield (5MI/d peak daily) based on historic licence conditions.
Description	Start abstracting from the source at Cold Bath Springs and pump into Barrow No 3.
Time to implementation	Engineering and infrastructure requirements would be associated with this option to bring it back into supply. Time to implementation likely to be up to 6 months.
Permissions required	Drought Permit from Environment Agency.
Environmental Effects (SEA)	<p>Moderate to major but temporary adverse effects anticipated regarding the water topic and the biodiversity, fauna and flora topic due to potential effects of the abstraction on groundwater, groundwater dependent ecosystems and/or any dependent surface waters and associated ecology.</p> <p>Minor to moderate adverse, medium term temporary effects are anticipated with respect to landscape and visual amenity due to water level changes to groundwater-dependent watercourses. Similarly, potential for minor to moderate adverse effects with respect to the archaeology and cultural heritage topic regarding any heritage assets located in the zone of influence, including any paleoenvironmental deposits and the potential presence of historic remains.</p> <p>Minor or negligible adverse effects anticipated with respect to other SEA topics.</p> <p>Minor beneficial effects are anticipated with respect to population and human health due to the provision of additional essential water supplies in an extreme drought event.</p> <p>Negligible beneficial effects are anticipated with respect to the other SEA topics.</p>
Data requirements to support detailed assessment	<p>Existing baseline data from SEA Environmental Report.</p> <p>Existing information associated with when the source was in supply.</p> <p>Baseline data on groundwater levels and spring flows in the area and any available drawdown data.</p> <p>Location of any GWDTEs and/or dependent surface water bodies.</p> <p>The presence and location of any paleoenvironmental deposits or historic remains in waterlogged conditions.</p>
Trigger and further assessment required if option is to be implemented during an extreme drought	The additional environmental data relevant to the option will be collated when the Level 3 (DMZ 5) trigger is reached to carry out a detailed assessment in accordance with the SEA methodology if the option is likely to be required following dialogue with the EA. Further assessment will follow the EAR approach to confirm the summary impacts identified in this table.

Table E10 Supply – Re-instate source at Gurney Slade

Type of action	Comments
Area affected	Whole supply area / whole resource zone
Trigger for implementation	Forecasting that we are going to be approaching the Level 4 trigger within 6 weeks.
Estimated benefit/saving	2MI/d yield based on estimated dry weather yield – previous licence 4.4MI/d annual average from May to October (10MI/d peak daily)
Description	Start abstracting from the source at Gurney Slade and either pump into Line of Works, or installation of temporary treatment plant of site.
Time to implementation	Engineering and infrastructure requirements would be associated with this option to bring it back into supply. Time to implementation likely to be up to 6 months.
Permissions required	Drought Permit from Environment Agency. Regulation 27 risk assessment to be completed and a Regulation 28 report submitted to DWI.
Environmental Effects (SEA)	<p>Moderate to major but temporary adverse effects anticipated regarding the water topic and the biodiversity, fauna and flora topic due to potential effects of the abstraction on groundwater, groundwater dependent ecosystems and/or any dependent surface waters and associated ecology.</p> <p>Minor to moderate adverse, medium term temporary effects are anticipated with respect to landscape and visual amenity due to water level changes to groundwater-dependent watercourses. Similarly, potential for minor to moderate adverse effects with respect to the archaeology and cultural heritage topic regarding any heritage assets located in the zone of influence, including any paleoenvironmental deposits and the potential presence of historic remains.</p> <p>Minor or negligible adverse effects anticipated with respect to other SEA topics.</p> <p>Minor beneficial effects are anticipated with respect to population and human health due to the provision of additional essential water supplies in an extreme drought event.</p> <p>Negligible beneficial effects are anticipated with respect to the other SEA topics..</p>
Data requirements to support detailed assessment	<p>Existing baseline data from SEA Environmental Report.</p> <p>Existing information associated with when the source was in supply.</p> <p>Baseline data on groundwater levels and spring flows in the area and any available drawdown data.</p> <p>Location of any GWDTEs and/or dependent surface water bodies.</p> <p>The presence and location of any paleoenvironmental deposits or historic remains in waterlogged conditions.</p>
Trigger and further assessment required if option is to be implemented during an extreme drought	The additional environmental data relevant to the option will be collated when the Level 3 (DMZ 5) trigger is reached to carry out a detailed assessment in accordance with the SEA methodology if the option is likely to be required following dialogue with the EA. Further assessment will follow the EAR approach to confirm the summary impacts identified in this table.